The Asters and Goldenrods of Ontario; a photo field guide to the differentiation between common and rare goldenrod and aster species found in the 5 forest regions of Ontario. Ecosite types, genus characteristics, medicinal properties and uses, habitat, distribution maps, summer and winter field identification features as well as propagation and cultivation are among the many sources of information found within the pages of this

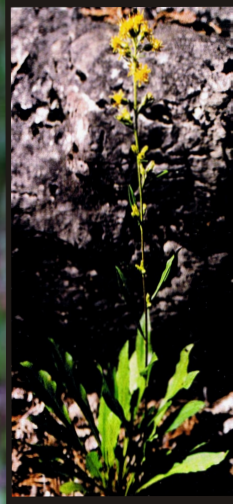
This field guide incorporates Level 2 terrestrial plant course material into 2 chapters for students of the EARTHQUEST Biological Field School. A total of 36 species, including 6 SARs are presented. Asters and goldenrods are among the most difficult of the composite family to identify. This is based on over 25 years of practical field experience and presents over 250 colour photos. Once you have learned the system of differentiation the art of aster and goldenrod field recognition and identification should become easier with field practise.

Dave Jolly is the Senior Biologist/Consultant of EARTHQUEST Environmental Consultants and Senior Instructor of the EARTHQUEST Biological Field School. He has been teaching Plant identification since 1995 and has catalogued and identified 180 families, 570 genera and over 2000 species of vascular plants in Ontario, including over 100 SARs. Dave is instrumental in helping numerous people find and maintain employment in the environmental industry. He is an avid nature photographer, writer and lecturer. He has two step children and five grand children and lives near Long Point, Ontario, Canada.

EARTHQUEST Biological Field School

Field Guide Series 4: Asters and Goldenrods

The Asters and Goldenrods; *A Photo Field Guide* of Ontario



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Asters and Goldenrods of Ontario

A Photo Field Guide

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Contributors

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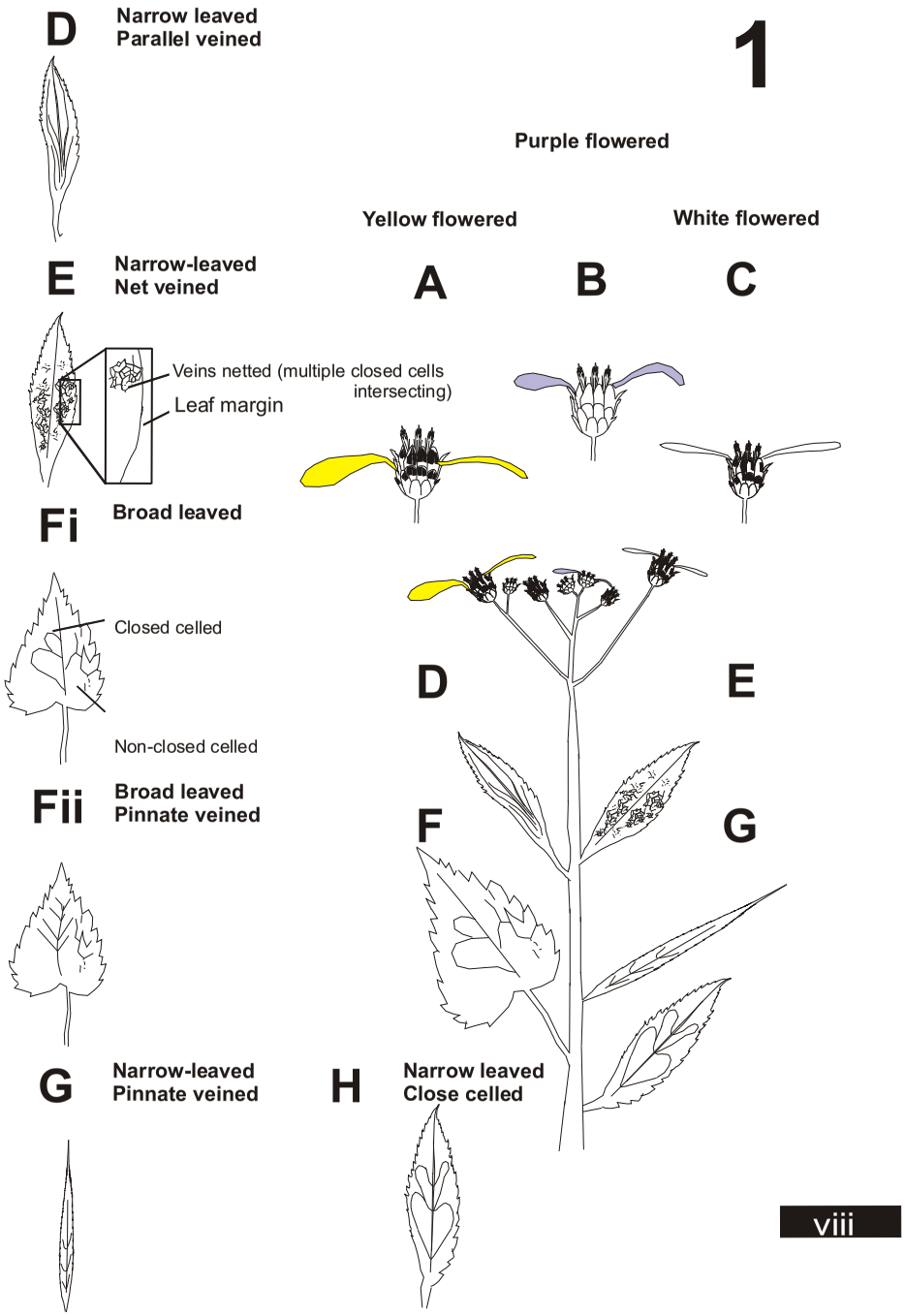
Figure 1



Goldenrods

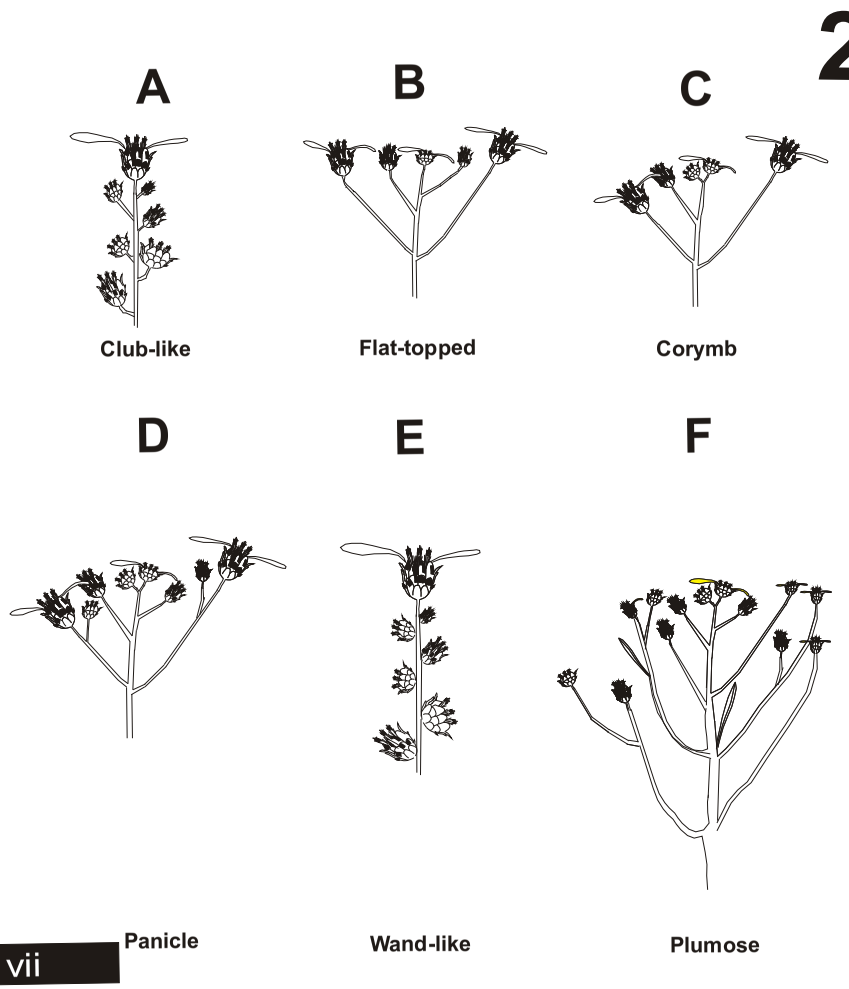
Index

Topic

Flowerhead arrangements

Figure 2

When field identifying Asters and Goldenrods it may be difficult to differentiate. It is important to have a starting point. A useful point to begin is with the flowerhead arrangement. These breakdown to six arrangements: Club-like, Flat-topped, Corybm, Panicle, Wand-like, and Plumose. One species has a solitary flowerhead.

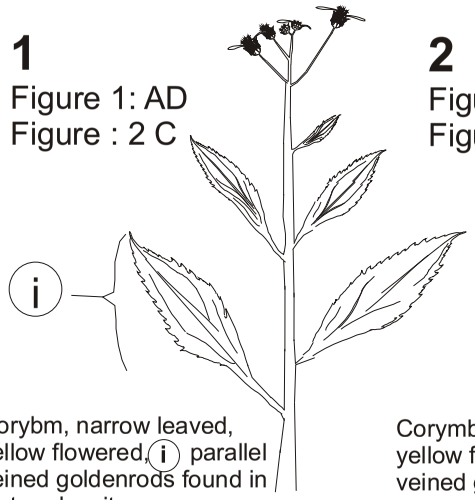


Plant groupings

Figure 3

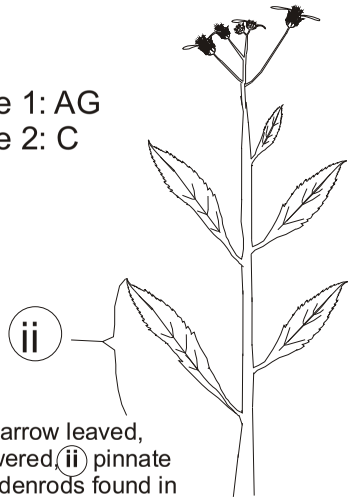
There are 12 groupings that all Asters & Goldenrods fall into based on their flowerhead arrangement, flower colour, leaf venation and leaf shape: wide or narrow leaved..

1
Figure 1: AD
Figure : 2 C



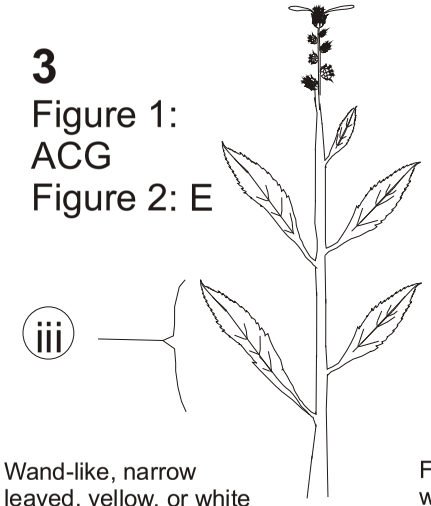
Corybm, narrow leaved, yellow flowered, (i) parallel veined goldenrods found in wet or dry sites

2
Figure 1: AG
Figure 2: C



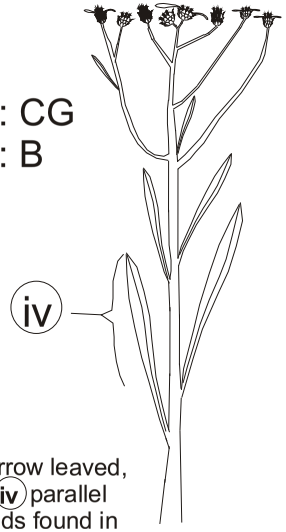
Corymb, narrow leaved, yellow flowered, (ii) pinnate veined goldenrods found in wet or dry sites

3
Figure 1: ACG
Figure 2: E



Wand-like, narrow leaved, yellow, or white flowered, (iii) pinnate veined goldenrods

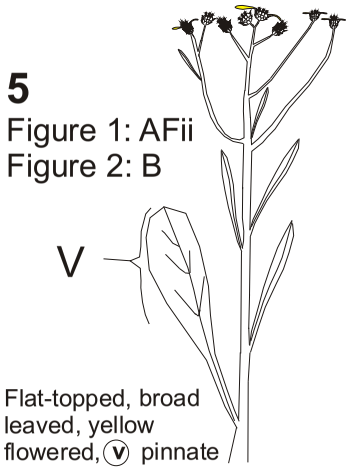
4
Figure 1: CG
Figure 2: B

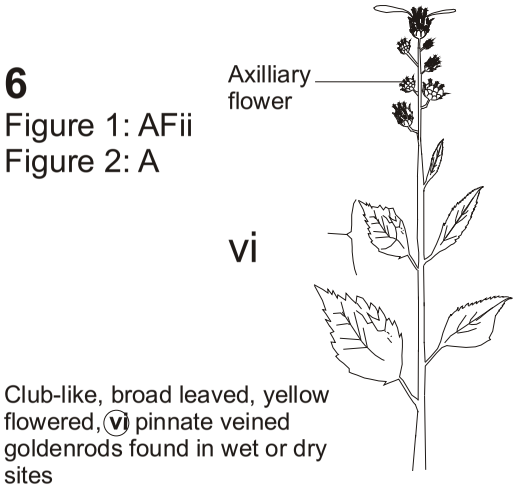


Flat-tiopped, narrow leaved, white flowered, (iv) parallel veined goldenrods found in dry sites

***Solidago*: Goldenrod Genus**

Goldenrods can be some of the most difficult vascular plants to identify and the task may seem overwhelming to the beginner. With practice, students can learn to classify them into broad groups by implementing the **5 second rule**. The goldenrod groups consists of roughly 30 varieties in our area, 7 of which are Ontario species (SAR) at risk (Semple, *et al.,* 1999). One species - Upland white aster (*Solidago asteroides*) possesses white flowers and physically resembles an Aster, but genetically belongs to the Goldenrods. They are all characterized by small tightly clustered yellow composite flowers which may be elm-branched, wand-like, club-like, plumose or flat-topped in growth pattern. Once the field identifier has identified which growth pattern they have the **5 second rule** suggests to examine the upper leaves compared to the lower leaves in order to arrive at species level identification. In some species there is a change from sessile leaves to those with petioles or stalks. Next, compare leaf venation and the amount of serration along the leaf margins. All goldenrods group roughly into narrow leaved and broad leaved varieties. Finally, they may be grouped according to the shape of the flower head arrangements and lastly by habitat; dry sites, or wet sites. Twenty species, including 4 provincially rare, from Site Regions 6 & 7E are presented in this chapter.



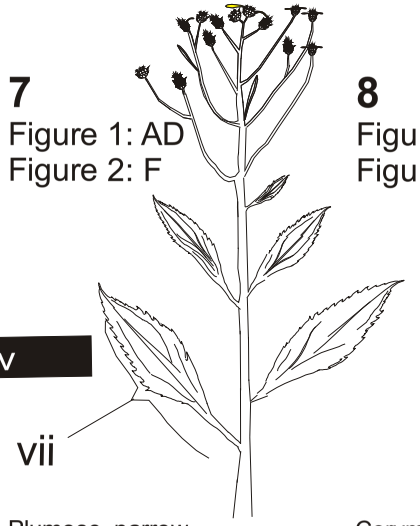


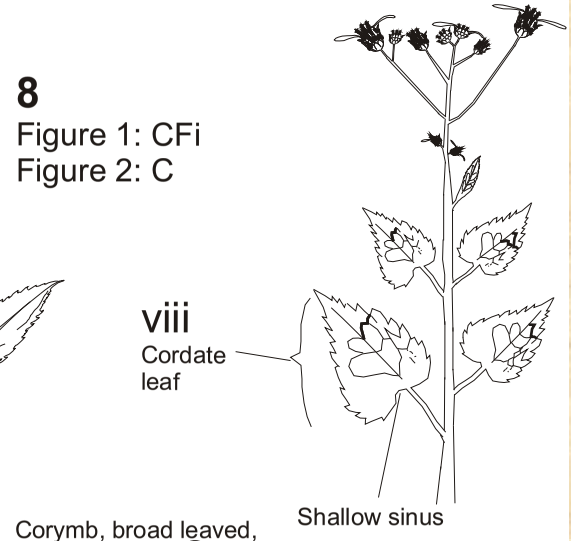
Aster groupings

Figure 4

Goldenrod Genus - *Solidago*

- Flowerhead arrangement elm-branched, flat-topped, club-like, wand-like or plumose
- Flowers small, usually yellow (one exception) and organized in tight clusters with 20 or more disk florets and 5 - 20 or more ray florets
- Species identified by leaf venation (pinnate or parallel veined) and amount of serration along leaf margins
- Habitat aids in species identification (wet or dry sites)





1 v

Propagation

This information is intended for those interested in applying restoration ecology to site s that require it. Propagating or cultivating seeds of Ontario Species at Risk is prohibited and illegal without permits. Some growers will have ready made seed mixes for different habitats and levels of disturbance - eg meadow marsh. Sow seeds after flowering or as soon as ripe. Chilling seeds in the fridge for two weeks can improve the germination rate. When large enough to handle seedlings should be placed in individual pots in light shade in a greenhouse until the first winter. Plant to permanent positions by early summer.

Cultivation

Prefers moderately fertile moisture retentive soil in full sun or partial shade. Grows best in heavy clay soils. Excellent plant for attracting wildllife and various beneficial insects to control insect pests.

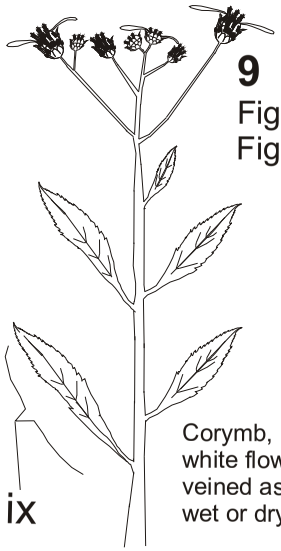
Confusing species Plants within the same genus or family, possibly from other families, which are easily mistaken in the field due to similar visual/physical characteristics. Applying the 5 second rule methodology will generally rule out discrepancies encountered in the field between confusing species.

Monoecious A plant which has both male and female flowers on the same plant (hermaphroditic). Cross pollination is necessary to produce a viable seed.

Dioecious A plant which has male and female flowers on different plants. These plants may be self fertile

Medicinal Properties The parts of the plants which may be used to cure ailments, including how to prepare them into teas, tinctures and concoctions

Ecological Preferences The soil moisture regime and drainage preferences along with the standard ecosite types from standard Ecological Land Classification (ELC) principles are provided. In some cases the plants which may be found growing in association or proximity to the plant are given to provide habitat specifications.

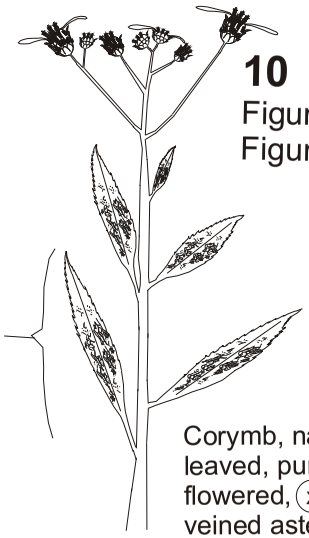


9
Figure 1: CG
Figure 2: C

ix

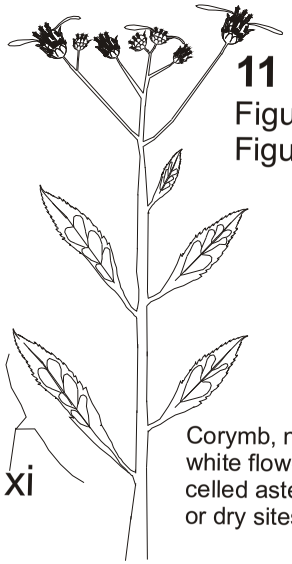
Corymb, narrow leaved, white flowered (ix) pinnate veined asters found in wet or dry sites

x



10
Figure 1: BE
Figure 2: C

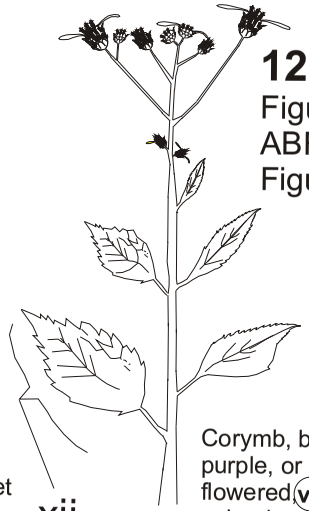
Corymb, narrow leaved, purple flowered, (x) net veined asters found in



11
Figure 1: CH
Figure 2: C

xi

Corymb, narrow leaved, white flowered (xi) close-celled asters found in wet or dry sites



12
Figure 1: ABFii
Figure 2: C

xii

Corymb, broad leaved, purple, or white flowered (vii) pinnate veined asters found in wet or dry sites

iv

Narrow-leaved yellow flowered, corymb, pinnate veined goldenrods found in wet or dry sites

Rough stemmed goldenrod (*Solidago rugosa*)

Native to Ontario
Common

Winter
Growth

Summer
Growth

Erect, elm branched panicled flowerheads; may grow from 30 to 150 cm

Winter flowers

Flowers

6 - 12 petals arranged in tight clusters along terminal end of flower stalks

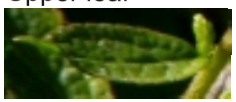
Bottom leaf

Lanceolate, tapering to a sharp point, pinnately veined, closed cells with serrated margins along top 2/3 part of leaf. Stalked with phlanged petioles. Middle and lower leaves may be easily confused with Flat topped white aster (*A. umbellatus*)

Middle leaf

Lanceolate with heavy serrated margins; pinnate veination, closes cells (veins close up as they reach margins). One of the only Goldenrods that exhibits this trait.

Upper leaf



Similar to lower leaves, but sessile; pinnately veined, not close celled with serrated margins. Obovate to lanceolate

Confusing species

Easily misidentified with *S. canadensis* and hybrid *S. canadensis* x *S. caesia* due to similiarity in flowerhead branching arrangement. Also confused with *S. gigantea*, *S. altissima*. Leaves confused with *A. umbellatus* before flowers appear, which also possesses closed cell veination.

5 Second Rule Check

Elm-branched flowerhead in older plants; sessile, entire margined upper leaves, lanceolate middle and lower leaves with serrated margins. One of the only goldenrods with closed cell veination. May be found around periphery of wetlands.

2

Ecological Preferences

Grows to zone 3. Plant prefers partial to full sunlight in moist light sandy, medium loamy and heavy clay soils. Moderately dry (0) to fresh (1, 2, or 3) moisture regimes which are rapid (2) to well drained (3) Fresh moist Sugar maple - Yellow birch deciduous forest (FOD 6 - 3) and fresh-moist Sugar Maple-Hardwood Deciduous forest (FODM6-5) ecosites. Found growing in association with Eastern bracken fern, Trembling aspen, Eastern white pine and Glaucous honeysuckle

Habitat

Pastures, woods and wet ground

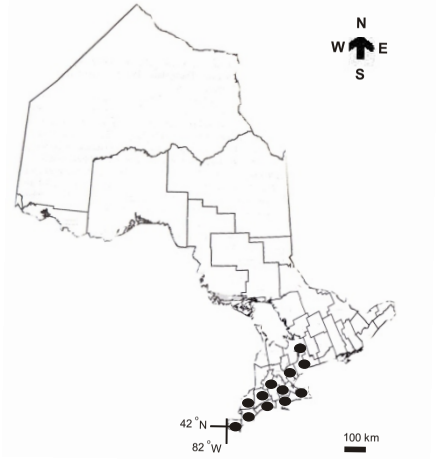
Ecological Information

Plants send up flower stalks in second year.

Distribution

Carolinian, Mixed deciduous

Distribution of Rough stemmed goldenrod in Ontario



Involucre bract

Tapering to a point; linear, chlorophyllous zone running through middle

Disk floret

2 - 7, pale yellow, pappus hairs shorter than disk corolla, multiple ridges on achene

How to use this book and definitions

Each section of this book that deals with flora is organized in evolutionary order. In the plant section, the top portion of the coloured rectangular box contains the common or vernacular and latin name for the species. Each plant family is identified by a colour as seen on page 16. The plant's provincial status is provided immediately below the common/latin name. Photos display the spring, summer, fall and winter growth patterns, whenever possible along with leaves, flowers, fruits, seeds, bark, upper, middle and bottom leaves. Plant species descriptions also highlight confusing species which may easily be mistaken in the field, medicinal/edible properties, ecological preferences such as soil type, moisture regime and drainage patterns, cultivation and propagation along with a distribution map (if possible). Although most medicinal/edible properties are based on the author's knowledge of plants within a certain genus readers are advised to use ingredients suggested in the text under their own discretion and to consult a medicinal herbalist or holistic doctor. A seasonal status is provided at the end of each plant chapter summarizing the best times of the month during the field season to see a particular plant . These charts are only accurate for those months and should not be considered a complete and comprehensive expression of the abundance of all plants which may be found during those months.

Provincially rare plants are denoted with an "S" rank. This is a rank assigned by the Ontario Ministry of Natural Resources to provide information on population levels. Plants ranked S1 to S3 are Ontario Species at Risk (SAR) and are managed and protected under the provincial Species at Risk Act (SARA). The ranking system is defined as follows;

S1 A plant which is considered extremely rare, with between 1 and 5 occurrences, populations or site records documented for the province

S2 A plant which is considered very rare, with between 6 and 20 occurrences, populations or site records documented for the province

S3 A plant which is considered rare, with between 21 and 100 occurrences, populations or site records documented for the province

S4 A plant which is considered common, with between 101 and 1000 occurrences, populations or site records documented for the province

S5 A plant which is considered very common, with over 1000 occurrences, populations or site records documented for the province

In some cases, plants may have more than one S rank to denote the uncertainty at that time of records. For example, a plant ranked S2S3 is both very rare and rare and more field work or research is needed to determine the exact rank.

All S rank plants are catalogued and documented by the Natural Heritage Information Center (NHIC) in Peterborough, Ontario. When a SAR plant is discovered by field botanists a rarity report is filled out and submitted to the NHIC and this contributes to the S rank when NHIC reviews and updates the status of plants for their database. For GIS utilizers the NHIC also has downloadable shape files representing 1 x 1 kilometer squares for the entire province with Ontario SARs within them. A 1.2 million record ACCESS database is attached to this shape file which allows practioners to ascertain the presence of SARs in areas being considered for field work.

The Committe on the Status of Endangered Wildlife in Canada (COSEWIC) assigns national ranks to flora in Canada, while the Committee on the Status of Species at Risk in Ontario (COSSARO) and the Ontario Ministry of Natural Resources (MNR) assign provincial status to endangered, threatened and vulnerable (special concern) plants. The ranking system is defined as follows;

END Endangered; Any indigenous species that, on the basis of the best available scientific evidence, is indicated to be threatened with immediate extinction throughout all or a significant portion of its Ontario range.

THR Threatened; Any indigenous species that, on the basis of the best available scientific evidence, is indicated to be experiencing a definite non-cyclical decline throughout all or a major portion of its Ontario range. It is likely to become endangered if the factors responsible for the decline continue.

VUL Vulnerable; Any indigenous species that is represented in Ontario by small, but relatively stable populations, and/or that occurs sporadically, or in a very restricted area in Ontario, or at the fringe of its range Populations Should be monitored periodically for evidence of possible decline.

The terminology used within the text of the pages which cover each species within the genus begins with the formal definition of the genus, based on the three most prominent traits or visual features of the genus. The number of genera or species within the genus which may be found within the 5 forest regions of Ontario is given along with information about the natural history, medicinal/edible values, etc.. These are defined as follows;

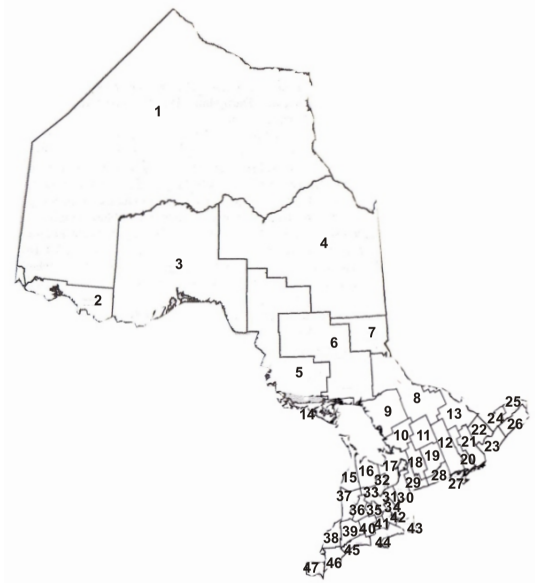
5 Second Rule Check These are the main visual cues or traits which may be used to accurately field identify the plant to family, genus and species level within 5 seconds or less by using the standard 5 second rule methodology. This methodology is taught almost exclusively to students at the EARTHQUEST Biological Field School.

In total there are over 70 species of trees and 2000 plant species which live in the Carolinian forest region for part of all of the year. This region of Canada contains on a national level more rare species than any other place in Canada because of the climate. Approximately 7 species are endangered, 2 are threatened and 8 are vulnerable in this region of high biodiversity. Some of the rare plant species include Butternut (*Juglans cinerae*), which is endangered, Common hop (*Ptelea trifoliata*), which is provincially rare, Pawpaw (*Asimina triloba*), provincially rare and Swamp rose mallow (*Hibiscus moschuetos)*, which is listed as vulnerable. These are only found within the Carolinian forest region. The highest biodiversity of rare flora in the province occurs on Pelee Island, off the southern tip of Point Pelee National Park. This is the most southern point in Canada.

On a larger scale the province of Ontario is divided into 5 major forest regions or ecoregions; Carolinian, Mixed deciduous, Boreal, Barren tundra and Tundra. The province has over 3000 vascular plant species. This book deals with all 5 ecoregions, with emphasis on the Carolinian and Mixed Deciduous ecoregions, which are otherwise referred to by most practioners as Site Regions 7E and 6E respectively. This book will be helpful for resource planners, ecologists, scientists, students, teachers, botanists, restoration ecologists, cultivators, gardeners, naturalists and others with an interest in plants. A total of 17 Ontario SAR vascular plant families representing 26 genera and 29 species are covered. Most of the plant species are trees, shrubs and wildflowers. We have purposely left grasses, sedges, rushes, ferns and club mosses out for treatment in later publications.

All photos display the vital components of the plant parts which will aid in quick and accurate field identification such as flowers, bark, leaf buds, scars, fruit, seed, during spring, fall, summer and winter growth forms for trees and shrubs; leaf or flower shape, size, arrangement, seeds, fruits, drupes or berries during spring, summer, fall and winter for wildflowers. Additionally, habitat requirements, cultivation, propagation, medicinal/edible values along with regional and provincial status are described. Distribution maps indicate which counties the plant may be found according to the distribution map below and were adopted from the works of Mike Oldham & Brinker, 2009 “Rare Vascular Plants of Ontario - Forth Edition”;

Distribution Map of Ontario



1. Kenora
2. Rainy River
3. Thunder Bay
4. Cochrane
5. Algoma
6. Sudbury
7. Timiskaming
8. Nipissing
9. Parry Sound
10. Muskoka
11. Haliburton
12. Hastings
13. Renfrew
14. Manitoulin
15. Bruce
16. Grey
17. Simcoe
18. Victoria
19. Peterborough
20. Lennox & Addington
21. Frontenac
22. Lanark
23. Leeds & Grenville
24. Ottawa-Carlton
25. Prescott & Russell
26. Stormont Dundas & Glengary
27. Prince Edward
28. Northumberland
29. Durham
30. York
31. Peel
32. Dufferin
33. Wellington
34. Halton
35. Waterloo
36. Perth
37. Huron
38. Lambton
39. Middlesex
40. Oxford
41. Brantford
42. Hamilton-Wentworth
43. Niagara
44. Haldimand-Norfolk
45. Elgin
46. Kent
47. Essex

Narrow-leaved yellow flowered, plumose, parallel veined goldenrods found in dry sites

Canada goldenrod (*Solidago canadensis*)

Winter
Growth

Summer
Growth

Erect, plumose branched panicled flowerheads; pubescent stems, may grow from 30 to 150 cm

Native to Ontario
Common

Flowers

Flowers

6 - 12 petals arranged in tight clusters along terminal end of flower stalks

Bottom leaf

Lanceolate, tapering to a sharp point, parrellel veined with sharply serrated margins along top 2/3 part of leaf. Veins appear three nerved; serrations may extend below most pronounced veins. Lower veins may extend to base of leaf. May be stalked with phlanged petioles suggesting hybridization.

Confusing species
Tall goldenrod *S. gigantea*, Late goldenrod *S. altissima.* Leaves confused with Flat topped white aster A. *umbellatus* and Rough stemmed goldenrod *S. rugosa* before flowers appear

Upper leaf

Similar to lower leaves, but sessile; parrallel veined with serrated margins. Obovate to lanceolate

Middle leaf

Similar to upper & lower leaves; wider, parrallel veined with serrated margins. Obovate to lanceolate

Solidago complex
Middle and lower leaves may be easily confused with Flat topped white aster *A. umbellatus* or Rough stemmed goldenrod *S. rugosa*, but veins not close celled. Canada goldenrod wild populations exhibit extensive variation and form a polyploid complex with two distinct subspecies occurring in our area; *S. canadensis* spp. c*anadensis* and *S. canadensis* spp. *hargeri.* Additionally, Tall *S. gigantae* and Late *S. altissima* goldenrods hybrids are believed to have evolved from a common *S. canadensis* ancestor.

4

5 Second Rule Check
Plumose flowerhead; sessile, entire margined upper leaves, lanceolate middle and lower leaves with serrated margins along upper 2/3 of leaf. Pubescent upper stem with wider leaves than *S. gigantae* &*S. altissima*

Ecological Preferences

Grows to zone 3. Plant prefers partial to full sunlight in moist light sandy, medium loamy and heavy clay soils. Moderately dry (0) to fresh (1, 2, or 3) moisture regimes which are rapid (2) to well drained (3) Dry-fresh Poplar-White Birch Deciduous Forest (FOD 3) and fresh-moist mixed meadow (MEMM4) ecosites. Found growing in association with Yarrow, Bouncing bet, Late and Tall goldenrods.

Habitat

Open fields, disturbed areas, roadsides

Ecological Information

Plants send up flower stalks in second year.

Distribution

Carolinian, Mixed deciduous, Boreal, Barren tundra, Tundra

5 second rule Leaf comparison

Bottom Middle Upper

Involucre bract

Tapering to a point; linear, chlorophyllous zone running through middle

Disk floret

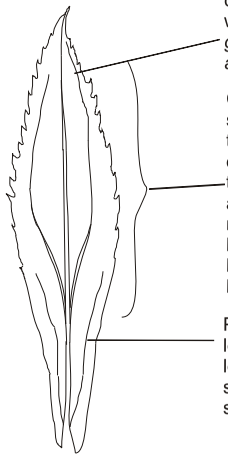
2 - 7, pale yellow, pappus hairs shorter than disk corolla, multiple ridges on achene

Oblanceolated to, ovate; 6 - 18 cm long, 4 - 6 cm wide. Long petioles; coarsely serrated. Basal leaves resemble *S. juncea*

Short stalked, elliptical to ovate; 3 - 5 cm long, 1.5 - 2 cm wide, coarsely serrated

Sessile elliptical, 1 - 4 cm long, 1 - 3 cm wide; finely serrated or entire margined, may have stipules

Visual ID tip (middle leaf)

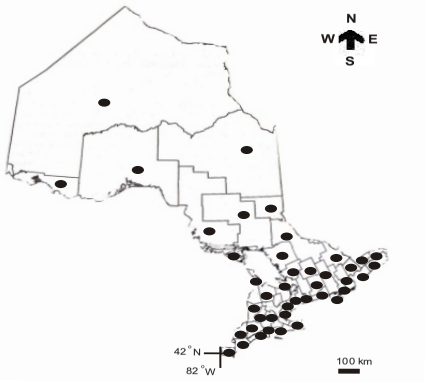


Parallel veins extend to leaf tip. Generally two parallel veins. Leaves comparatively wider than *S. gigantae* and *S. altissima*

Coarsely serrated teeth extend 2/3 the way along leaf margin, but may begin higher up.

Parallel veins at leaf base where leaf attaches to stem & below serrations

Distribution of Canada goldenrod in Ontario



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How the Biological Field School benefits students

Students learn field census/survey methods which are used as standards in the environmental industry to document the presence or absence of avifauna, population monitoring, habitat and ecological preferences, etc. The field methods involve a high degree of practical field skills which are acquired through attending field and in-class sessions. These sessions may last 3 months to 2 years in duration. Students are also evaluated based on performance in the field, assignments and in depth field tests. Those who perform well may be awarded internships or job opportunities at EARTHQUEST or partner organizations. Many students end up working full time for the government, environmental consulting firms and Conservation Authorities.

The EARTHQUEST Biological Field School works with Employment Centers, universities and colleges to match students with prospective jobs. Many students experience obstacles or difficulties with finding and maintaining jobs after completing a degree or diploma in the sciences. The Biological Field School is the first and only of it's kind in Canada and works to remove obstacles to make students more attractive to potential employers. Many of the students have been working for several years, but cannot find a job in their chosen field.

When a student seeks to enroll in the Biological Field School they are assessed on their current skills to see how closely they match to the needs and demands of employers. How much practical field experience they may have, their educational background along with their goals, wants and desires determines which program and how many courses are required. Students interested in terrestrial ecology and biology would elect to enroll in terrestrial field courses and programs. Those interested in medicinal plants and ethnobotany would enroll in medicinal plant courses. The Biological Field School specializes in five main disciplines; primatology, or the study of primates, ethnobotany or medicinal plants, general field biology, field botany and field ornithology, or the study of birds.

Data Collection

The majority of data compiled for this publication arose out of the combined efforts of students and staff of the EARTHQUEST Biological Field School. EARTHQUEST teams were composed mainly of college or university aged students with an interest or background in the environment. At the core of these projects and courses were intelligent and talented individuals with the determination to learn and grow within their work. I am grateful to those students who continue to strive for excellence by submitting photos and voucher specimens for this book.

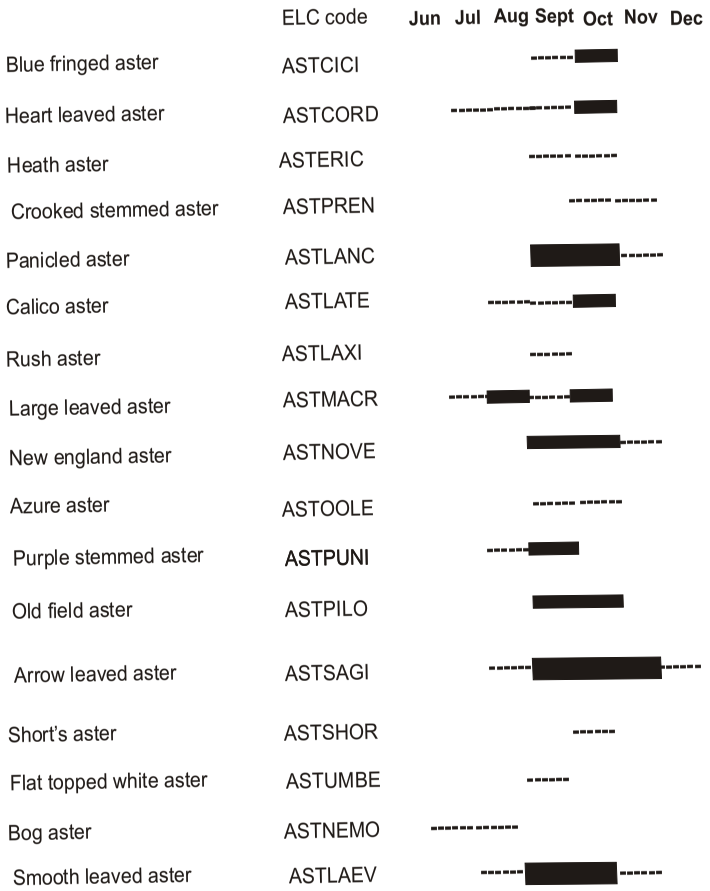
The census of flora species involved the use of a library of field guides to aid in field identification. Plant species were counted if they were seen flowering, and/or rare. Flowering dates were entered into a massive 27 000 record ACCESS database along with distribution, status, family common name, genus latin name, location, primary observer, and frequency. S or provincial ranks were verified with the Natural Heritage Information Centre. R or regional ranks were ascertained for most species through data analysis and filtration in ACCESS. Photographs of all specimens encountered were collected in a large photo repository showing flowers, upper, middle and bottom leaves, bark, fruit, seeds, stem, etc..

Observations of potentially new or rare species are greatly appreciated and acknowledged and should be forwarded to;

Dave Jolly, Senior Instructor
EARTHQUEST Biological Field School
171 Lakeshore Road, RR #2
Port Burwell, Ontario, Canada
N0J 1T0

Tall goldenrod (*Solidago gigantea*)

Seasonal Flowering time of Asters in Ontario



Legend

- 1 - 10 times seen per month
- 10 - 15 times seen per month
- 15 - 20 times seen per month
- 20 - 25 times seen per month

ELC code Ecological Land Classification code

Winter
Growth

Summer
Growth

Erect, plumose branched panicled flowerheads; stem smooth or glabrous, may grow from 50 to 180 cm

Native to Ontario
Common Hybridizes readily with *S. altissima*

Flowers

Flowers

7 - 15 petals, bright yellow

Middle leaf

Lanceolate to linear with petioles, serrations along upper 2/3 of leaf. Parallel veined; 1 on each side of mid-rib joining below serrations

Upper leaf

Sessile with a single mid-rib, entire margins; lanceolate

5 Second Rule Check

Plumose flowerhead; sessile, entire margined upper leaves, lanceolate middle and lower leaves with serrated margins; smooth stem

Confusing species

Canada goldenrod *S. canadensis*, Late goldenrod *S. altissima*. Some authors may refer to Tall goldenrod as Smooth goldenrod *S. gigantea*

This is one of the most commonly seen and confusing goldenrods found in open fields and meadows. Moreover, the common name Late and Tall are interchangeable between *S. altissima and S. gigantea*. Some field botanists may also refer to both Late and Tall goldenrods as Narrow leaved goldenrod. *S. altissima* readily hybridizes with Tall goldenrod (*S. gigantea*) and forms a complex known as the Canada goldenrod complex. Hybrids tend to have characteristics found in both Tall and Late goldenrods plus bushiness with sub-branches and leafy "suckers" along the main stem. The 5 second rule should be applied to the upper, middle and lower leaves. Also refer to Semple,1999

Ecological Preferences

Grows to zone 6. Plant prefers partial to full sunlight in moist light sandy, medium loamy and heavy clay soils. Moderately dry (0) to fresh (1, 2, or 3) moisture regimes which are rapid (2) to well drained (3) Dry-fresh Sugar maple deciduous forest types (FODM5-1), Poplar-White Birch Deciduous Forest (FOD 3) and Fresh-moist mixed meadow (MEMM4) ecosites. Found growing in association with Yarrow, bedstraws, Canada and Late goldenrods.

Habitat

Open fields and woods, streambanks

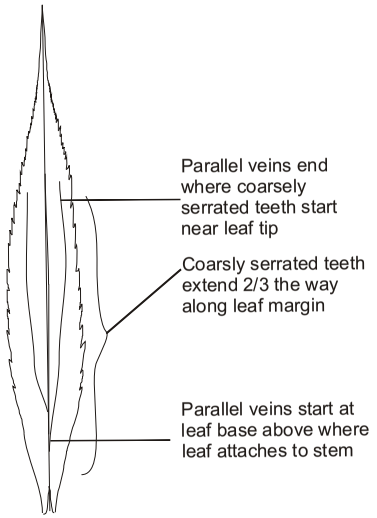
Ecological Information

Plants send up flower stalks in second year.

Distribution

Carolinian, Mixed deciduous, Boreal, Barren tundra, Tundra

Visual ID tip (middle leaf)



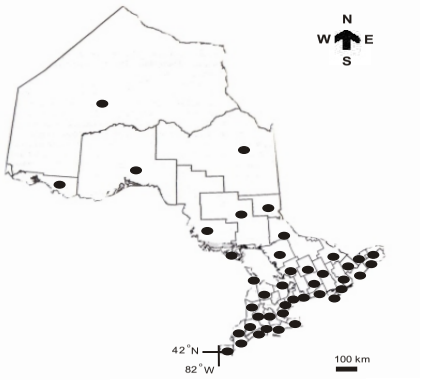
Involucre bract

Blunt tipped, diamond shaped chlorophyllous zone running through middle

Disk floret

6 - 12, pale yellow, pappus hairs shorter than disk corolla, multiple ridges on achene

Distribution of Tall goldenrod in Ontario



Ecological Preferences

Grows to zone 3. Plant prefers partial to no shade in moist light sandy, medium loamy and heavy clay soils. Moderately dry (0) to fresh (1, 2, or 3) moisture regimes in shallow substrates over bedrock, rock, sands and coarse loams which are rapid (2) to well drained (3) Dry-fresh Sugar maple-Beech Deciduous Forest (FODM5-2) ecosites. Found growing in association with White trillium, Rough stemmed and Zig-zag goldenrods.

Habitat

Rich moist woods, wet areas, trail paths, open fields and meadows

Ecological Information

First and second year plants are in basal rosettes. Plants send up flower stalks in second year.

Cultivation

Easily grown in partial or no shade. Prefers dry soils in the shade amongst the roots of other plants. Possesses an invasive root system. Slugs are fond of this species. Hybridizes readily with other species in the Genus, particularly Heart leaved aster (*A. cordifolius*).

Distribution

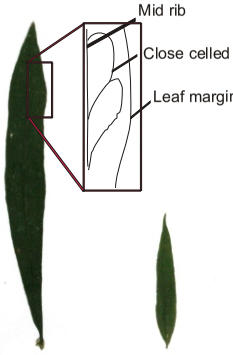
Carolinian, Mixed deciduous, Boreal, Barren tundra

5 second rule Leaf comparison

Bottom

Narrowly to moderately elliptic, short stalked, entire margined; 15.2 cm long, 3 cm wide, pinnately veined, closed at mid-rib.

Middle

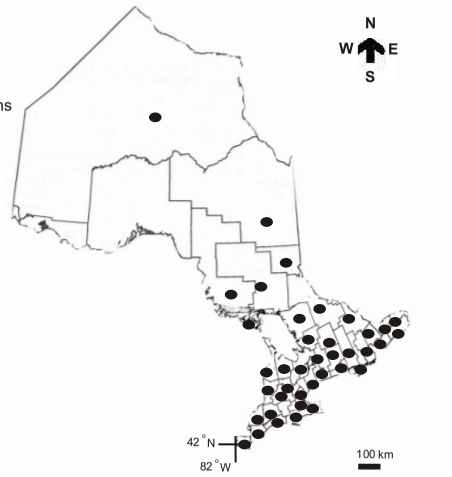


Similar to bottom leaves; 13.2 cm long, 1.8 cm wide. Only Aster with closed cell veins.

Upper

Sessile, lanceolate, entire margined; 6.8 cm long, 0.8 cm wide.

Distribution of Flat topped white aster in Ontario



Involucre bract

Tapering to a point, chlorophyllous zone extends through middle

Disk floret

10-40, yellow, achenes, 1 rib per side pubescent, pappus shorter than disk corolla

Narrow-leaved flat topped, pinnate veined white flowered asters, found in wet sites

Flat topped white aster (*Doellingeria umbellata* var. *umbellata*)

Native to Ontario
Common

Summer
Growth

Erect, flat topped corymb flowerhead; may grow from 30 to 150 cm.

Fall
Growth

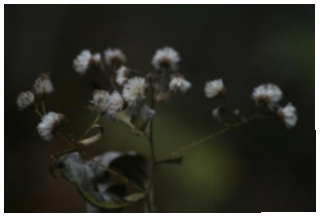
Leaves

Upper leaves sessile, middle and bottom leaves tapering to base; narrowly to broadly elliptic

Flowerside

4-15 petals, white

Flowerhead



Involucre bracts are retained, disk floret corolla may be absent or dark

5 Second Rule Check
Flat topped flowerhead arrangement, white flowers in wet areas, leaves resemble Canada goldenrod

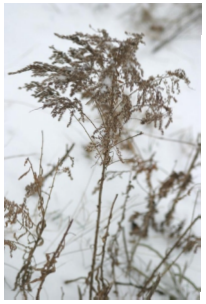
Leaf venation

Veins hug leaf margins, forming closed cells which roll back to mid rib; one of the only asters that exhibits this trait

Confusing species
Canada goldenrod (*Solidago canadensis*), and Rough stemmed goldenrod (*Solidago rugosa*) after flowering

Late goldenrod (*Solidago altissima*)

Winter
Growth



Summer
Growth

Erect, plumose branched panicled flowerheads; stem smooth or glabrous may grow from 50 to 200 cm

Native to Ontario
Common hybridizes readily with *S. gigantea*

Flower

Flowers

10 - 15 petals arranged in tight clusters along terminal end of flower stalks

Upper leaf

Sessile with a single mid-rib, entire margins; lanceolate

5 Second Rule Check
Plumose flowerhead; sessile, entire margined upper leaves, lanceolate middle and lower leaves with serrated margins

Medicinal Uses
Flowers and leaves are used as an agent to cause tissue contractions. Cold or hot tea made from leaves may be used to treat fevers.

Preparation:
Tea: 1 tsp. Dried leaves, 2 tsp. fresh to 1 cup water

Bottom leaf

Lanceolate to linear with petioles, serrations along upper 2/3 (similar to *S. gigantea*) to 1/3 of leaf. Parallel veined; 1 on each side of mid-rib (main leaf vein)

Confusing species
Canada goldenrod *S. canadensis*, Tall goldenrod *S. gigantea*. Some authors may refer to Tall goldenrod as *S. altissima*

This is one of the most commonly seen and confusing goldenrods found in open fields and meadows. Moreover, the common name Late and Tall are interchangeable between *S. altissima* and *S. gigantea*. Some field botanists may also refer to both Late and Tall goldenrods as Narrow leaved goldenrod. *S. altissima* readily hybridizes with Tall goldenrod (*S. gigantea*) and forms a complex known as the Canada goldenrod complex. Hybrids tend to have characteristics found in both Tall and Late goldenrods plus bushiness with sub-branches and leafy " suckers" along the main stem. The 5 second rule should be applied to the upper, middle and lower leaves. Also refer to Semple, 1999.

Ecological Preferences

Grows to zone 3. Plant prefers partial to full sunlight in moist light sandy, medium loamy and heavy clay soils. Moderately dry (0) to fresh (1, 2, or 3) moisture regimes which are rapid (2) to well drained (3) Dry-fresh Sugar maple deciduous forest types (FODM5-1), Dry-fresh Poplar-White Birch Deciduous Forest (FOD 3) and fresh-moist mixed meadow (MEMM4) ecosites. Found growing in association with Yarrow, Bouncing bet, Late and Tall goldenrods.

Habitat

Fields, disturbed areas, roadsides

Ecological Information

Plants send up flower stalks in second year.

Distribution

Carolinian, Mixed deciduous, Boreal, Barren tundra, Tundra

5 second rule Leaf comparison

Bottom Middle Upper

Short stalked lanceolate, 12.3 cm long, 1.4 cm wide; sharply serrated in upper 2/3 of leaf, above three nerved/parallel veins

Short stalked lanceolate, 12 cm long, 1.2 cm wide; sharply serrated in upper 2/3 of leaf, above three nerved/parallel veins

Sessile lanceolate, 5.2 cm long, 0.8 cm wide; finely serrated or entire margined

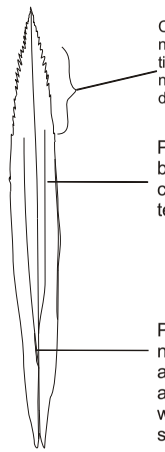
Involucre bract

Tapering to a point, diamond shaped chlorophyllous zone running through middle

Disk floret

3 - 7, pale yellow, pappus hairs shorter or equal in length to disk corolla, multiple ridges on achene

Visual ID tip (middle leaf)

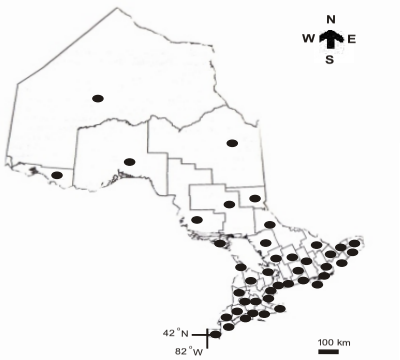


Coarsly serrated teeth near upper 1/3 to 2/3 tip of leaf margin. Do not extend all the way down to leaf base.

Parallel veins end below where coarsely serrated teeth start

Parallel veins start near leaf base above where leaf attaches to stem & well below serrations

Distribution of Late goldenrod in Ontario



Ecological Preferences

Grows to zone 3. Plant prefers partial to no shade in moist light sandy, medium loamy and heavy clay soils. Moderately dry (0) to fresh (1, 2, or 3) moisture regimes in shallow substrates over bedrock, rock, sands and coarse loams which are rapid (2) to well drained (3) Dry-fresh Cultural meadow (CUM1-1) ecosites. Found growing in association with Panicled aster, Stiff-leaved goldenrod, Foxglove beard tongue and Tall coreopsis.

Habitat

Moist woods, deciduous swamps

Ecological Information

First and second year plants are in basal rosettes. Plants send up flower stalks in second year.

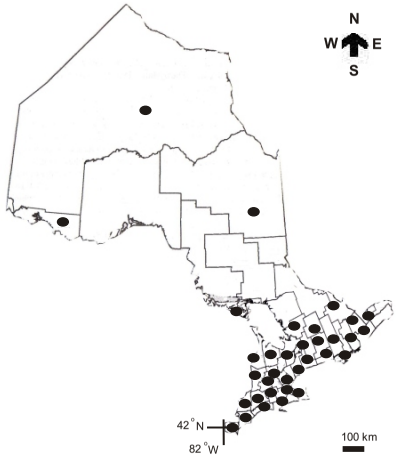
Cultivation

Easily grown in partial or no shade. Prefers dry ' soils in the shade amongst the roots of other plants. Possesses an invasive root system. Slugs are fond of this species. Hybridizes readily with other species in the Genus, particularly Heart leaved aster (*A. cordifolius*).

Distribution

Carolinian, Mixed deciduous, Boreal, Barren tundra, Tundra

Distribution of Heath aster in Ontario



Involucre bract

Pointed, densely hairy, short, diamond-shaped chlorophyllous zone covers upper 1/3 of involucre, upper & outer involucres spreading and reflexed

Disk floret

7 - 15, yellow, becoming brown, achenes pubescent and slightly ribbed, pappus equal to length of disk corolla

Heath aster (*Symphotrichum ericoides*)

Native to Ontario
Common

Summer
Growth

Erect, many flowered, panicled flowerhead; may grow from 40 to 90 cm.

Winter
Growth

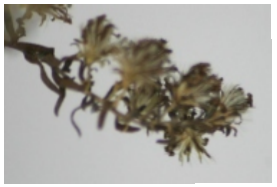
Upper leaves

Upper leaves linear to obolanceolate, entire margins

Flower

13 - 20 petals, small, white; smaller than *A. pilosum*

Flowers



Middle leaf

Middle leaves linear to obolanceolate, entire margins; veins appear netted and intersected

Flowerside

Involucre bracts strongly reflexive

Lower leaf

Lower leaves obolanceolate, entire margins

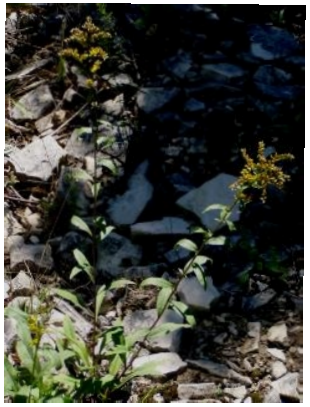
Confusing species
Calico aster *A. laterifolius*, but leaves thinner and smaller; taller than Old field aster *A. pilosum.* Hybrids of *A. novae-angliae* X *A. ericoides* exist and are called Amethyst aster (*A. amethystinum*)

5 Second Rule Check
Small linear to oblanceolate upper, middle and lower leaves with multiple flowerheads in panicle arrangement

Early goldenrod (*Solidago juncea*)

Winter
Growth

Summer
Growth



Erect, plumose branched panicled flowerheads; may grow from 30 to 100 cm

Native to Ontario
Common

Flowers

Flower and upper leaf

Sessile with a single mid-rib, entire margins; lanceolate. Flowers with 7 - 12 petals, pale to bright yellow

Bottom leaf

Lanceolate with petioles, entire margins in upper to middle leaves. Lower leaves with serrations on upper 1/3 of margins. Parallel veined; 1 on each side of mid-rib.

Fall basal leaves

Obovate to lanceolate with long petioles. Coarsely toothed

Basal leaves

Obovate to lanceolate with long petioles. Coarsely toothed in upper 1/3 of margins. Parallel veined

Medicinal Uses
Cold or hot root tea may be used to bathe head to treat headaches. Young leaves may be eaten added to salads or cooked.

Preparation:
Tea: 1 tsp. Dried roots, 2 tsp. fresh roots to 1 cup water

5 Second Rule Check
Plumose flowerhead; stipules or leafy phlanges at base of petioles in upper to middle leaves along main stem. Basal rosette leaves. Smooth surface, almost hairless on upper and under surface

Confusing species
Gray goldenrod *S. nemoralis* var. *nemoralis*

Ecological Preferences

Grows to zone 3. Plant prefers partial to full sunlight in moist light sandy, medium loamy and heavy clay soils. Moderately dry (0) to fresh (1, 2, or 3) moisture regimes in sands and coarse loams which are rapid (2) to well drained (3) Serviceberry cultural thicket (CUT 1 -2) ecosites. Found growing in association with Gray goldenrod, Yellow bedstraw and Brown knapweed

Habitat

Open fields and disturbed areas

Ecological Information

Plants send up flower stalks in second year.

Distribution

Carolinian, Mixed deciduous, Boreal, Barren tundra

5 second rule Leaf comparison

Bottom

Oblanceolated to, ovate; 20 - 35 cm long, 4 - 6 cm wide; finely serrated. Petioles may be winged. Basal leaves resemble *S. hispida* or *S. sempervirens*

Middle

Reduced upwards, linear to lanceolate, sessile, entire with leafy "suckers" out of axils

Upper

Sessile linear, 1 - 4 cm long, 1 - 3 cm wide; finely serrated, entire margined

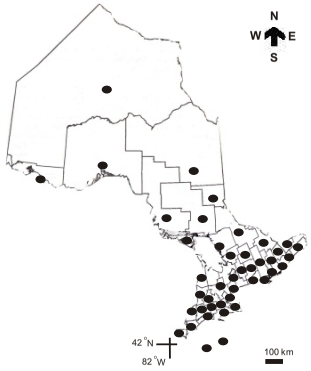
Involucre bract

Blunt tipped, diamond shaped chlorophyllous zone in upper 1/3

Disk floret

8 - 15, pale yellow, pappus hairs shorter than disk corolla, multiple ridged achene

Distribution of Early goldenrod in Ontario



Ecological Preferences

Grows to zone 3. Plant prefers partial to no shade in moist light sandy, medium loamy and heavy clay soils. Moderately dry (0) to fresh (1, 2, or 3) moisture regimes in shallow substrates over bedrock, rock, sands and coarse loams which are rapid (2) to well drained (3) open meadow ecosites. Found growing in association with Panicled aster, Red clover and Common sow thistle

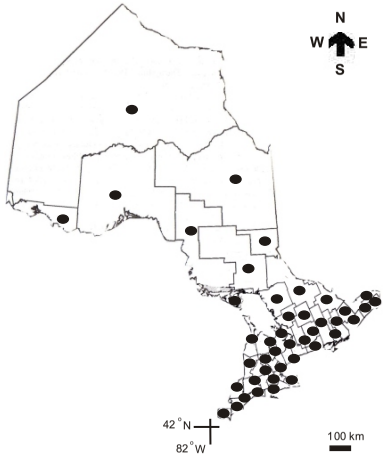
Habitat

Open fields and meadows

Distribution

Carolinian, Mixed deciduous, Boreal, Barren tundra, Tundra

Distribution of Old field aster in Ontario



Involucre bract

Oblanceolate, margins of tip inrolled appearing pointed, chlorophyllous zone diamond-shaped & covers upper 1/3 of involucre

Disk floret

25 - 45, yellow, becoming purple, achenes pubescent, pappus shorter than disk corolla

Old field or Frost aster (*Symphotrichum pilosus*)

Native to Ontario
Common

Summer
Growth

Erect, panicled flowerhead; may grow from 10 to 100 cm.

Fall & Winter
Growth

Upper leaves

Upper, middle and bottom leaves linear to obolanceolate entire margins, sessile; basal rosette leaves sessile, obolanceolate to obovate and spatulate

Flower

20-35 petals, white, may be pink or rarely pale blue; larger than *A. ericoides*

Flower

5 Second Rule Check
Linear leaves with multiple flowerheads in panicle arrangement

Confusing species
Calico aster *A. laterifolius*

Flowerside

Leaves

Middle leaves linear, entire margins; veins appear parallel

Gray goldenrod (*Solidago nemoralis* var. *nemoralis*)

Winter
Growth

Winter flowers

Summer
Growth

Erect, plumose panicled flowerheads; may grow from 20 to 80 cm

Flowerhead

Native to Ontario
Common

Bottom leaf

Sessile with a single mid-rib, pinnately veined, obovate to spatulate, coarsely toothed

Medicinal Uses
Cold or hot root tea may be used to bathe head to treat headaches. Young leaves may be eaten added to salads or cooked.

Preparation:
Tea: 1 tsp. Dried roots, 2 tsp. fresh roots to 1 cup water

Basal rosette leaves

Obovate to spatulate with long phlanged petioles. Coarsely toothed around margins. Parallel veined

Flowers

5 - 11; bright yellow petals

Confusing species
Early goldenrod *S. juncea*

5 Second Rule Check
Flowerhead plumose. Stipules or leafy phlanges at base of petioles in upper to middle leaves along main stem. Basal rosette leaves. Sub species populations that occur around Lake Superior Provincial Park are SARs - *S. nemoralis* var. *decemflora*

Ecological Preferences

Grows to zone 3. Plant prefers partial to full sunlight in moist light sandy, medium loamy and heavy clay soils. Moderately dry (0) to fresh (1, 2, or 3) moisture regimes in sands and coarse loams which are rapid (2) to well drained (3) Dry-fresh Poplar-White Birch Deciduous Forest (FOD 3) community & fresh-moist mixed meadow (MEMM4) and dry Black oak - Pine tallgrass savannah (SVMM1-2) ecosite. Found growing in association with Yarrow, bedstraws, Canada and Late goldenrods and Prairie buttercup.

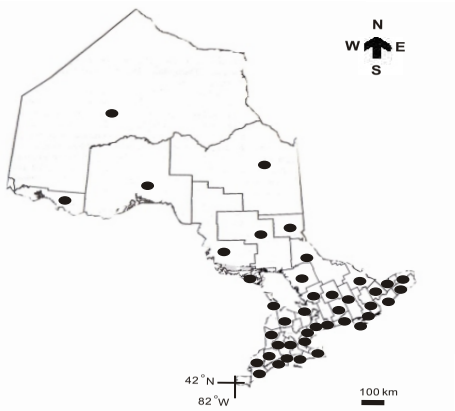
Habitat

Sandy sites, disturbed areas, roadsides

Ecological Information

Plants send up flower stalks in second year.

Distribution of Gray goldenrod in Ontario



Distribution

Carolinian, Mixed deciduous, Boreal, Barren tundra

Involucre bract

Blunt tipped, diamond shaped chlorophyllous zone in upper 1/3. *S. nemoralis* var. *decemflora* sub-species posseses hairy upper involucre bracts which are more pointed than *S. nemoralis* var. *nemoralis*

Disk floret

3 - 10, pale yellow, pappus hairs shorter or equal in length to disk corolla, hairy achene

Ecological Preferences

Grows to zone 3. Plant prefers partial to no shade in moist light sandy, medium loamy and heavy clay soils. Moderately dry (0) to fresh (1, 2, or 3) moisture regimes in shallow substrates over bedrock, rock, sands and coarse loams which are rapid (2) to well drained (3) Dry-fresh Poplar-White Birch Deciduous Forest (FOD 3) ecosites. Found growing in association with Ontario goldenrod, Sweet gale and Shrubby cinquefoil

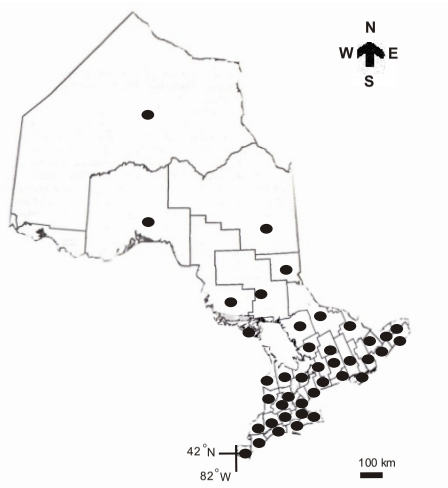
Habitat

Wet areas, shoreline of Georgian Bay and Lake Superior

Distribution

Carolinian, Mixed deciduous, Boreal, Barren tundra, Tundra

Distribution of Rush aster in Ontario



Involucre bract

Pointed, chlorophyllous zone diamond shaped

Disk floret

15 - 30, pale yellow, becoming brown - purple, achenes pubescent, pappus equal to length of disk corolla